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Population dynamics of brinjal shoot and fruit borer, *Leucinodes orbonalis* Guen. on brinjal at Kanpur agroclimatic region

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Abstract
The population dynamics of *Leucinodes orbonalis* Guen. (BSFB) on brinjal was studied at Student's Instructional Farm, C.S.A. University of Agriculture and Technology, Kanpur (U.P.) during 2014-15. Initial incidence of the BSFB was noticed on the 20th August to 29th October and continued till 15th Feb. The pest population recorded as number of larvae per plant varied from 0.30 to 5.30. The larval population was low during the month of November and varied between 0.30 to 4.10 larvae/plant. The pest population increased from 28th December to 17 January and reached its peak (5.30 larvae/plant) on first week of January. During this period the weather parameters like mean temperature and relative humidity ranged from 13.41 ^{0}C to 23.84 °C and 59.08 to 87.06 per cent respectively. The pest population declined thereafter and varied from 3.20 to 5.30 larvae/plant. During this period mean temperature and relative humidity ranged from 10.37 to 16.20 and 71.25 to 86.75 per cent, respectively. The Population of pest suddenly decreased in last of February, perhaps due to the reason that no more new leaves are produced. The Population was high in the absence of rains.

Keywords: Brinjal, *Leucinodes orbonalis* Guen. Population dynamics

Introduction
Brinjal (*Solanum melongena* L.) belongs to the Solanaceae family and referred by various names *viz*., eggplant, aubergine, garden egg, baingan, vankai, etc. It is one of the major and principal vegetable crops widely grown in temperate (during summer) and tropical regions of the globe. India is regarded as centre of origin and diversity of brinjal. Leaves and seed of brinjal are also used as necrotic and stimulants respectively Nadkarni 1927 [7]. It is the most-consumed and most-sprayed vegetable in India, where it is grown on more than 5,00,000 hectares, making it one of the main sources of cash for many farmers. Brinjal is well adapted to high rainfall and high temperatures and is among the few vegetables capable of high yields in hot-wet environments. Brinjal is good source of Vitamin A, Thiamine, Ascorbic acid and Phosphorus. They are also known to have alkaloid solanine in root and leaves. Brinjal is also a popular vegetable in China, Japan, Egypt, Italy, USA, Syria, Philippines, Thailand, Indonesia, France, and Turkey. Its immature fruits are used as vegetable and extensively used in various culinary preparations. Brinjal has got much potential as raw material in pickle making and dehydration Industries. It is highly productive and usually finds its place as the poor man's vegetable. Some medicinal uses of brinjal include treatment of diabetes, asthma, cholera, and bronchitis. The national share of brinjal in overall total production of vegetable is 8.3% during 2012-2013. In India overall ranking wise production of brinjal, West Bengal possesses the top rank from the production of 2.97 m. tones and 1.61 m. ha. Followed by Odisha and Andhra Pradesh. The brinjal crop is attacked by about 140 species of insect pests Dwivedi *et al.*, 2014. BSFB, L. orbonalis (Lepidopetra: Pyralidae) is the key pest throughout Asia Purohit and Khatri 1973 [10], Kuppuswamy and Balasubramanian 1980 [5], Allam *et al.*, 2003 [1]. In India, this pest has a countrywide distribution and has been categorized as the most destructive and most serious pest causing huge losses in brinjal Patil 1990 [9].

Materials and Methods
Studies on population dynamics of brinjal shoot and fruit borer *Leucinodes orbonalis* Guenee In brinjal *Solanum melongena* L. were conducted at Student's Instructional Farm, C.S.A. University of Agriculture and Technology, Kanpur (U.P.) during 2014-15. The experimental

site is situated in subtropical zone falling between 26.20° and 35.00° and Northern latitude and 80.18° and 84.34° Eastern longitude at the elevation of 125.9 m. above the mean sea level. The mean annual rainfall of the zone is about 800 mm. The climate of this zone is semi-arid and subtropical type. Seeds of brinjal variety Azad B-3,and Type-3 were sown separately on raised nursery beds in one centimetre deep lines about 5-6 cm apart in the 2nd fortnight of July, 2014. The experiment was laid out in Factorial Randomized Block Design having 3.0m x 3.6m plots with 20 treatments and 3 replications. Thirty days old seedlings of Azad B-3 (V_1), Type-3 (V_2) varieties were planted in separate plots each measuring 3.0 m x 3.6 m. The spacing between rows and between plants was respectively 60 cm x 60 cm in case of all varieties. Populations of shoot and fruit borer present on two varieties chosen for study were recorded separately in the morning hours at weekly interval. The methods of observations adopted for recording population of different effect of abiotic factors on the shoot and fruit damage due to *L. orbonalis*. The damaged fruits were harvested and carefully cut opened with a sharp knife to observe the presence of larvae in the fruits.

Results and Discussion

The population of *L. orbonalis* on brinjal crop along with meteorological observation during kharif 2014 has been presented in Table 1 figure 1. The data showed that the population of *L. orbonalis* appeared on 20th August to 29th October and continued till last week of 15th February. The pest population recorded as number of larvae per plant varied from 0.30 to 5.30. The larval population was low during the month of November and varied between 0.30 to 4.10 larvae/plant. The pest population increased from 28th December to 17 January and reached its peak (5.30 larvae/plant) first week of January. During this period the weather parameters like mean temperature and relative humidity ranged from 13.41 ^{0}C to 23.84 ^{0}C and 59.08 to 87.06 per cent, respectively. The pest population declined thereafter and varied from 3.20 to 5.30 larvae/plant. During this period mean temperature and relative humidity ranged from 10.37 to 16.20 and 71.25 to 86.75 per cent, respectively. The Population of pest suddenly decreased in last of February, perhaps due to the reason that no more new leaves are produced. The Population was high in the absence of rains.

These observations are close agreement with the earlier findings of Natrajan *et al.,* 2009 also reported the mean shoot damage ranged from 1.1 per cent (2nd week of February) to 28.2 per cent (4th week of August), while the fruit damage ranged from 10.0 (1st week of February) to 52.2 (lst week of December). In general, the shoot and fruit damage showed an increasing trend toward the end of year i.e. during winter month. The correlation studies between population of *L. orbonolis* with weather parameter showed significantly positive correlation with minimum and maximum temperature (r = 0.139 and 0.354 respectively) however, negative correlation was found with relative humidity (r = -0.232) and rainfall (r = 0.232). Mall *et al.,* 1992 also reported effect of temperature and negative effect of humidity on fruit population by *L. orboncilis.* Jat *et al.,* 2002 reported infestation of shoot borer started from 4th week of August and reached to its peak in the last week of September. Whereas fruit borer started damaging from first week of October, peaked in the 4th week of October and continued up to second week of December. Singh *et al.,* 2000 noticed 73.33 per cent infestation of the top shoots during the end of August by *L. orbonalis*, which peaked 86.66 per cent in the third week of September with an intensity of 2.09/plant. On the initiation of the flowering, the pest infestation continuously declined on the shoots and reached to zero level in the end of October.

Table 1: Population dynamics of *Leucinodes orbonalis* G. under different meteorological condition during 2014-15:

S.N.	10 day period	Average atmospheric temperature(c)		Average relative humidity (%)		Average rainfall (mm)	Population of *L. orbonalis* larval period
		Max.	Min.	Max.	Min.		
1.	20 Aug. to 29 Aug. 2014	37.12	27.55	73.5	53.1	0.0	0.30
2.	30 Aug. to 08 Sep. 2014	33.45	26.29	90.7	75.9	5.6	0.80
3.	09 Sep. to 18 Sep. 2014	31.60	24.13	94.1	79.1	8.15	0.60
4.	19 Sep. to 28 Sep. 2014	34.58	25.08	81.1	61.6	0.0	1.60
5.	29 Sep. to 08 Oct. 2014	35.20	24.16	79.9	60.2	0.0	2.70
6.	09 Oct. to 18 Oct. 2014	30.82	20.13	88.4	58.7	6.04	1.80
7.	19 Oct. to 28 Oct. 2014	31.30	17.91	89.6	43.7	0.0	2.90
8.	29 Oct. to 07 Nov. 2014	30.96	16.73	77.8	41.8	0.0	3.20
9.	08 Nov. to 17 Nov. 2014	29.10	13.64	84.2	38.0	0.0	3.50
10.	18 Nov. to 27 Nov. 2014	27.19	9.98	85.6	41.4	0.0	3.80
11.	28 Nov. to 07 Dec. 2014	27.69	12.33	81.7	40.7	0.0	4.10
12.	08 Dec. to 17 Dec. 2014	22.42	9.99	90.7	51.8	1.68	4.30
13.	18 Dec. to 27 Dec. 2014	17.45	6.22	98.0	65.9	0.0	4.90
14.	28 Dec. to 06 Jan. 2015	17.18	9.64	97.7	75.8	0.92	5.30
15.	07 Jan. to 16 Jan. 2015	13.95	6.80	97.9	81.9	0.0	4.70
16.	17 Jan. to 26 Jan. 2015	16.24	8.02	95.6	79.6	1.49	3.60
17.	27 Jan. to 05 Feb. 2015	21.17	9.23	93.9	64.0	0.0	2.80
18.	06 Feb. to 15 Feb. 2015	23.83	10.31	89.3	57.9	0.0	1.40

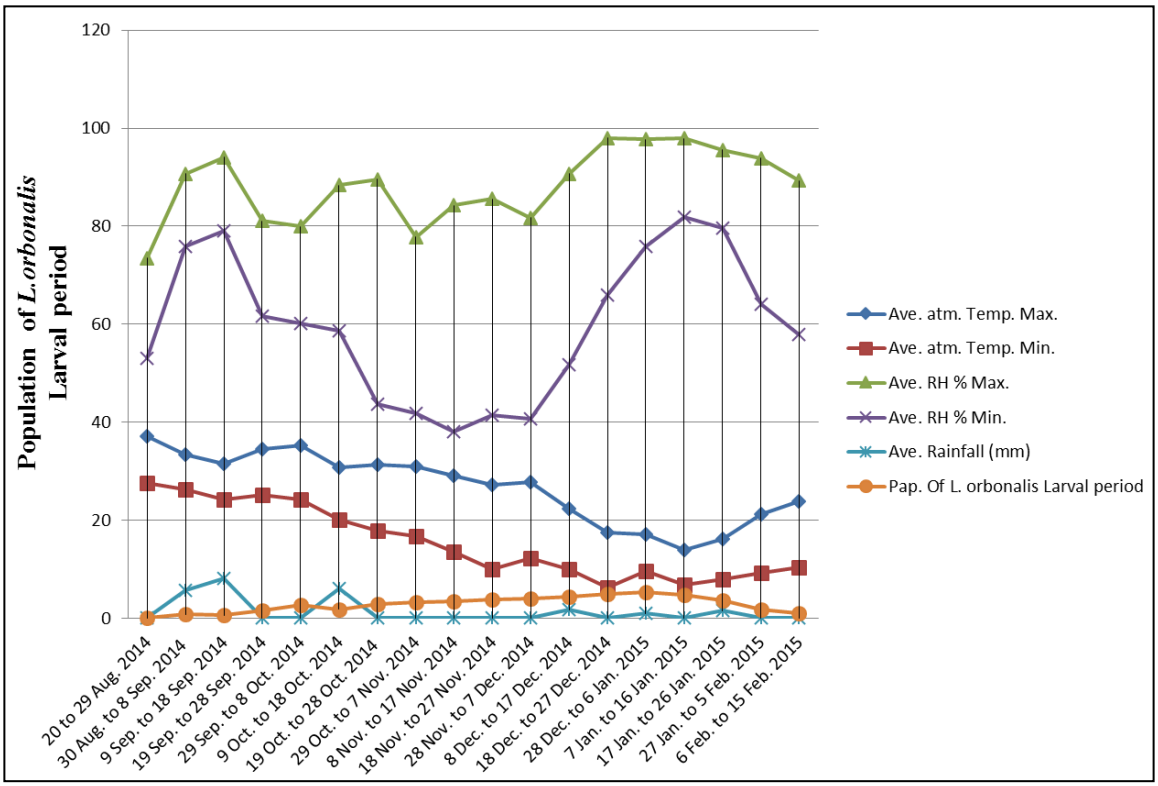

Fig 1: Population dynamics of *Leucinodes orbonalis* G. under different meteorological condition during 2014-15

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